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sponding limit is set for plant and animal life upon our globe.

T. J. J. See.

U. S. Naval Observatory, Washington, D. C., May 12, 1899.

ON THE NEW GENUS OF LAMPREY, MACROPHTHALMIA CHILENSIS.

The preliminary account of Dr. Plate's remarkable discovery published in the *Sitzungsberichte der Gesellschaft Naturforschende Freunde*, Berlin (1897, No. 8, pp. 137–141), has, as far as I am aware, received no comment in recent literature, although there can be little doubt that this remarkable Cyclostome has revived more of the important discussions as to the position of the Cyclostomes than any publication since the time of the classic pamphlet of Professor Dohrn, '*Der Ursprung der Wirbelthiere.*' And morphologists will, I am sure, await impatiently a further discussion of the anatomy of this newly discovered type, shortly to appear in the *Fauna Chilensis* in the Supplement Volume of the *Zoologische Jahrbücher*.

As the preliminary account is not readily accessible, it may be noted that this remarkable lamprey has large and normally developed eyes. It measures but 107 mm. in length, is of a brilliant silver-white color, and its sides are literally compressed, as in the case of many of the typical bony fishes. The back region is blue-black, with light yellow, dusky flakes on the anterior half of the forehead. It is also noteworthy that the sides of the body are perfectly smooth, lacking the markings of the muscles, common in other Cyclostomes. The nasal opening is slit-like, situated anterior to the eyes, and not opening in a papilla. The gill-slits are vertically compressed. The eye is of extraordinary size, 2.5 mm. in diameter, and resembles outwardly the eyes of a Teleost, with a circular pupil, 1 mm. in diameter. The dentition is relatively simple, and is said to resemble that of Myxine.

Plate has not as yet expressed his opinion as to the significance of his morphological prize; but, judging from a single phrase in his paper, he appears to regard it as a form which has not assumed parasitic habits, and has, therefore, not been subjected to degeneration. To what degree, however, will he support Dohrn's earlier teachings, which derived the Cyclostomes from a teleost-like ancestor? In any case, this discovery will by no means simplify the difficult problem as to the relationships of the Cyclostomes in general, for it is not unnatural to assume that if one of these forms has evolved normally developed eyes probably the others also may originally have possessed them, and that the present condition of cornea, lens and retina may reasonably be interpreted as degenerate instead of primitive. On the other hand, as far as the preliminary account enables one to judge, it is also possible to assume that under favorable conditions the Hyperoarte may have become highly specialized to the degree, indeed, of acquiring a more teleost-like body form, together with more completely developed visual structures. It is to be hoped that Dr. Plate has succeeded in collecting material which will throw light upon the relations of this new type from the standpoint of metamorphosis and embryonic development.

Bashford Dean.

NOTE ON THE SPAWNING SEASON OF THE EEL.

The recent and most interesting work of the Italian naturalists Grassi, Calandruccio and Ercolani has added, in all essential regards, the needed information regarding the spawning time, as well as the metamorphosis, of the eel. I do not find, however, in my review of the literature, any definite observations with regard to either

time or place of spawning of the eel in American waters, and I wish, therefore, to present a brief note on the only instance of a spawning eel which has, up to the present time, come within my notice. I had hoped to give further instances relating to this matter, but I have, unfortunately, been unable to secure additional data.

The general interest I have always had in the spawning of the eel has led me, from time to time during the past twenty-five years, to examine the condition of the ovary in numbers of specimens which have been brought to the New York markets during various seasons. The eggs which I have, however, noticed in this material were never larger than some which I observed twenty years ago in the so-called 'eel-fat,' that is to say, minute ovarian eggs, measuring possibly .03 mm. in diameter. It has long been known, in a general way, that in this neighborhood the eels are usually taken in great numbers during November and December, at the time of their passage seaward down the Hudson or in Gravesend Bay; and it has always been supposed that the spawning takes place within a month or so of this time, since in the early spring the elvers (*montées*), which ascend the rivers, are found never measuring less than two inches in length. That the actual spawning-time, however, may be a much later one, seems to me now more than probable for the following reason: On May 8, 1898, my attention was brought to an eel containing ova which separated readily from the ovary and filled the cavity of the abdomen, and I am able to give the following notes relating to this very unusual specimen. I find it was taken at Atlantic Highlands by Lewis Morris, in relatively shallow water, between two and three fathoms, in a locality which is well known as an eeling ground. The color of the specimen was relatively bright, but not unusually so, nor was the eye notably larger than in similar specimens from the same locality. The specimen was relatively small, measuring 42 cm. in length, and weighed but 135 grammes. The eggs are .4 mm. in diameter. A microscopic examination of the ova made by my friend, Professor Dean, of Columbia University, shows that the germinative vesicle is clearly defined, and that the egg is all but mature. The ova, as I have already noted, are readily shaken free from the ovarian tissue.

The distinct interest of this observation appears to be this, that the eel may, in exceptional instances at least, ripen its eggs in relatively shallow water, possibly in the inlets of many of the bays and sounds, instead of at the great depths which the European observers have hitherto regarded as necessary for sexual maturation. As far as I am aware, the only instance of the taking of a sexually matured eel has been in waters of one hundred or more fathoms in depth. In all these instances, moreover, the female eel has been of considerable size, at least half again as large as the present example.

The present specimen, moreover, gives us a clue to the spawning time of the eel in our neighboring waters; in any event, it demonstrates that here the season of ovulation, during the month of May or thereabouts, is certainly many months later than in the Mediterranean, for in the latter locality, according to Grassi and Calandruccio (*Fischerei Zeitung*, XXII., 428), the eggs can only be found between the months of September and January. I should note, however, that the possibility is not excluded that the present eel was of exceptional sexual characters, like the small examples of shad showing almost ripened eggs which are sometimes taken one and even two months in advance of the regular 'run.'

EUGENE G. BLACKFORD.